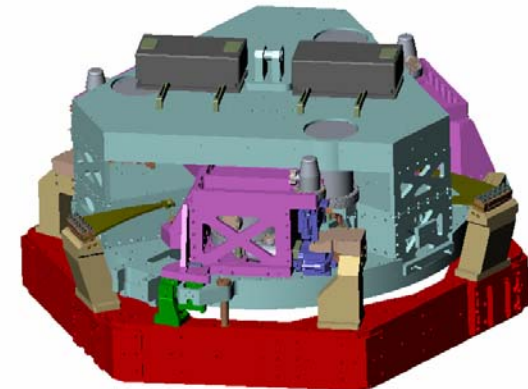


Lasti ISI Update

March 2007

On behalf of the SEI
Team

LIGO-G070185-00-Z



The SEI Team

MIT

Stephany Foley
Bob Lalierte
Myron Macinnis
Fabrice Matchard
Ken Mason
Rich Mittleman
Laurent Ruet

Stanford

Daniel Clark
Tarmigan Casebolt
Dan DeBra
Brian Lantz

And I'm sure that I've
missed a few

Mike Zucker

LLo/LSU

Joe Giaime
Joe Hanson
Brian O'Reilly
Shyang Wen

Caltech

Ben Abbott
Dennis Coyne
Lee Cardenas
Jay Heefner

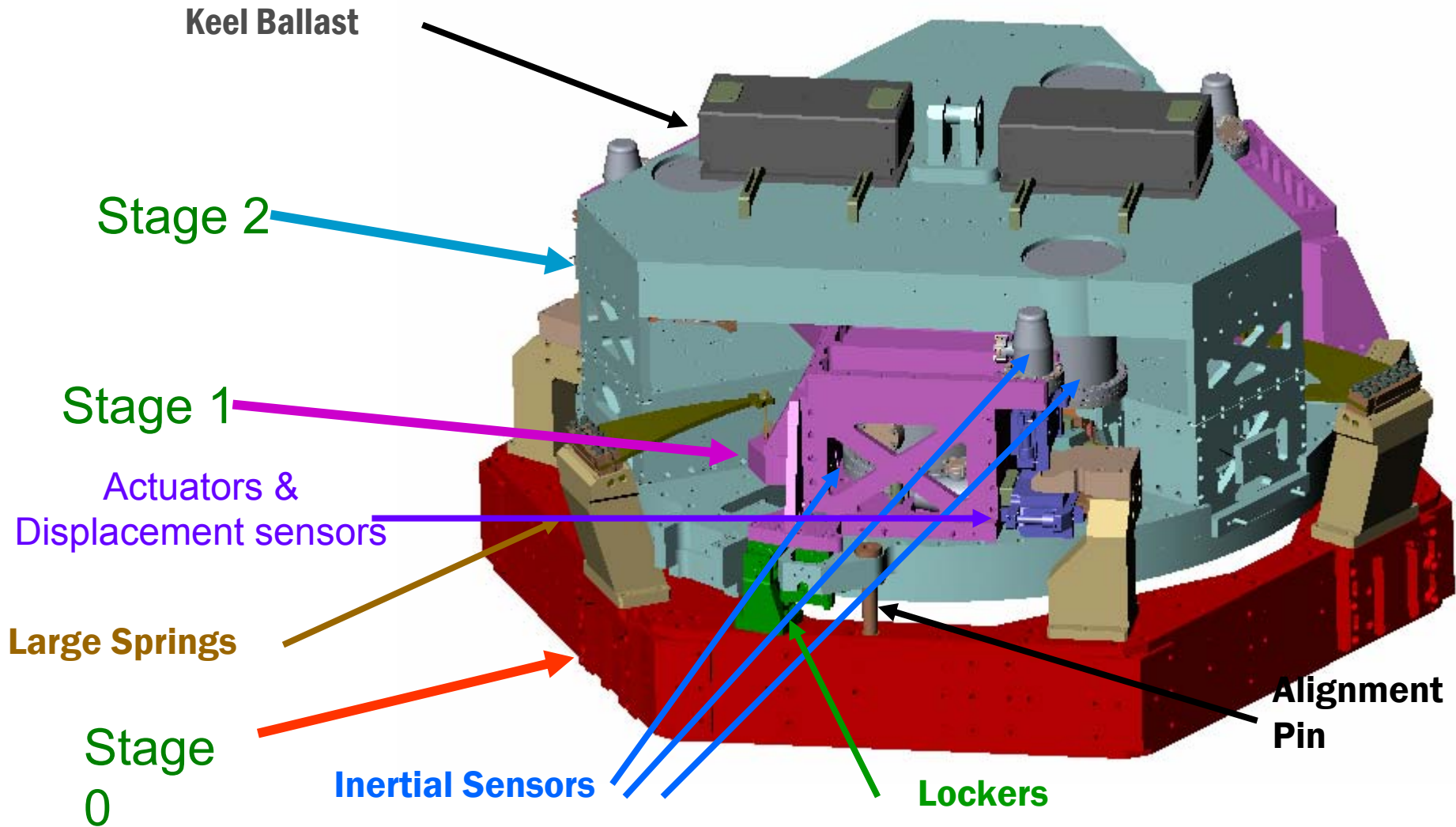
LHO

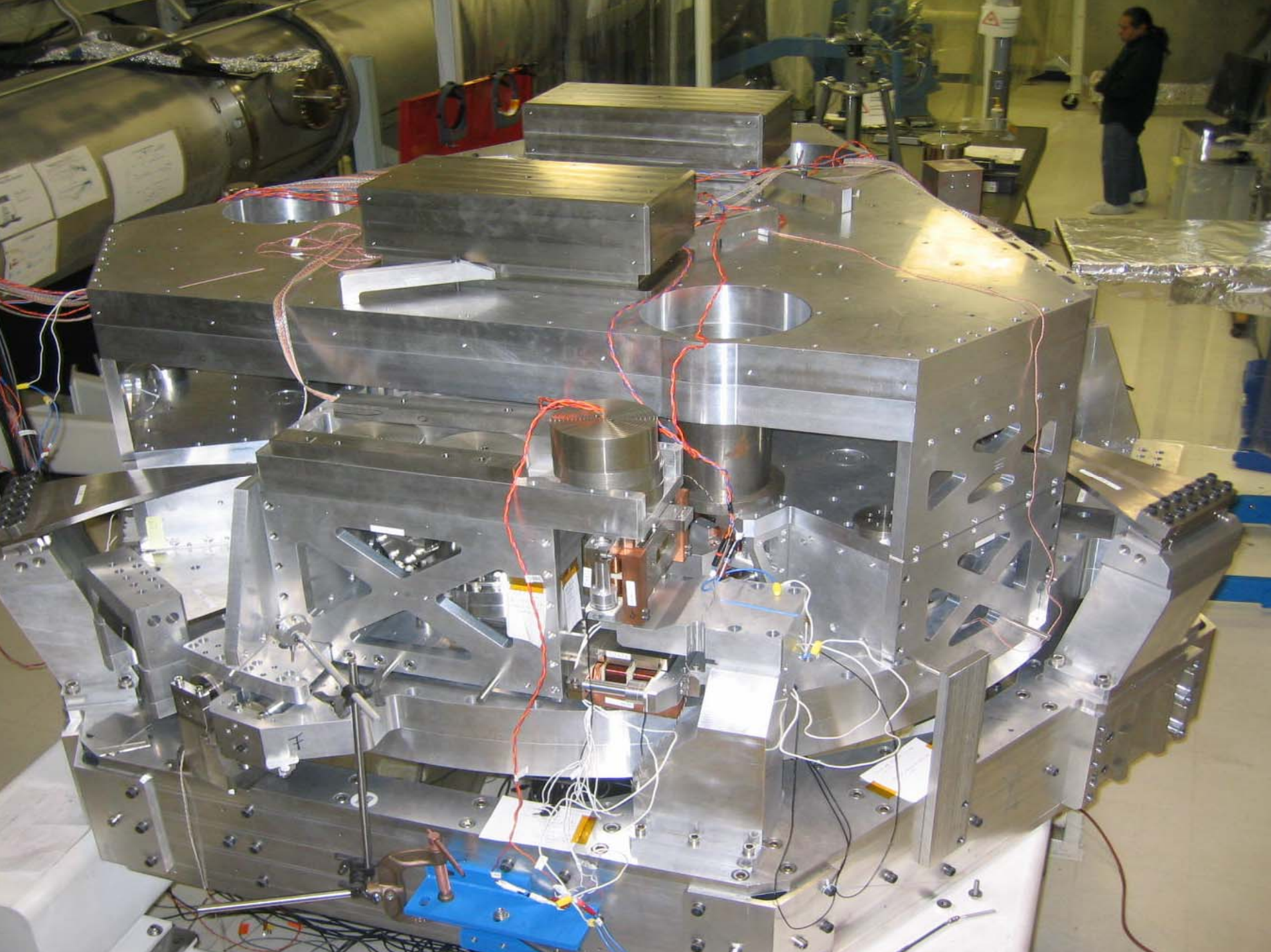
Corey Gray
Hugh Radkins

Where we are now

- Finished Dirty Testing Phase
- Suspended at full load
- Tested the stages for Resonances (verify that a bolted structure works)
- Understand the ASI Model
- Writing assembly procedures
- Taking care of minor redesigns
- Designing some new tooling
- Disassembling for cleaning
- Preparing for Clean assembly

Three Stage ISI

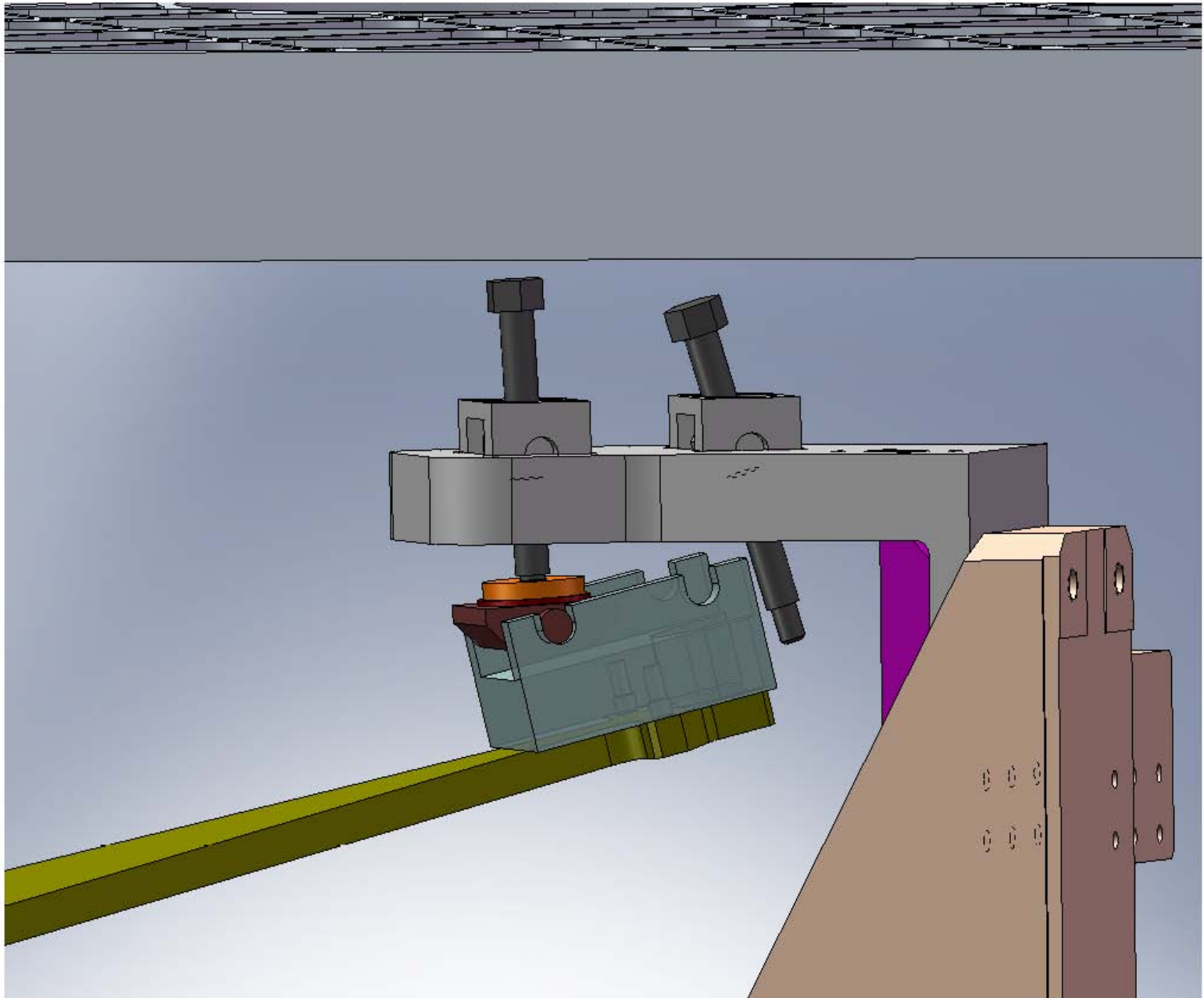




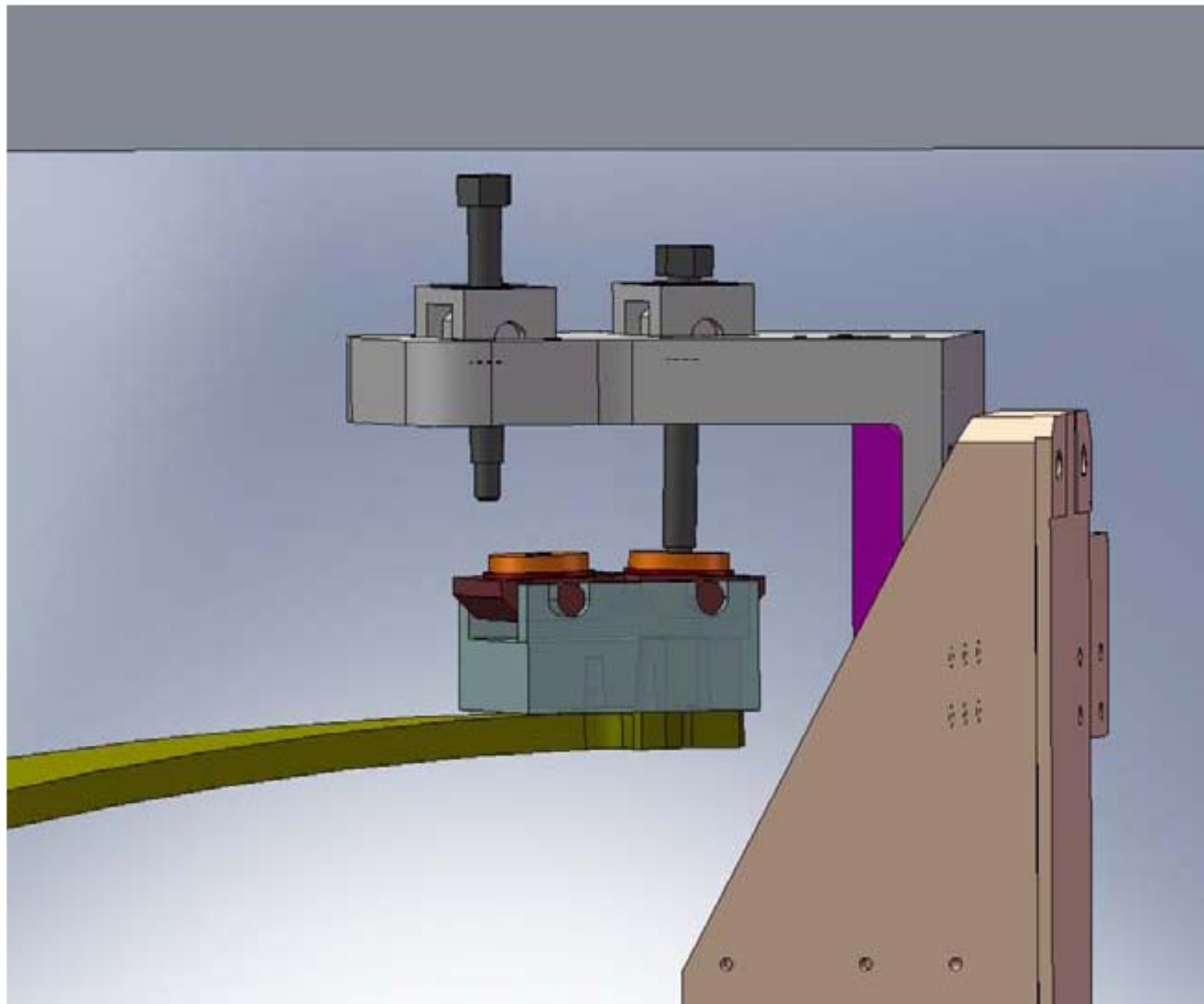
Assembly

- Over all the assembly went very smoothly
 - ~300 parts & 3000 bolts
- Some Tooling Problems
 - Spring Pre-loaders
 - Actuator positioning brackets
- One set of screw holes (6 holes) misplaced
- A few very difficult bolts (some redesign)
- Some Electronic Problems (mostly displacement sensors)
- It was a learning experience

1) Blade unloaded



3) Fully loaded



ISI vs ETF

- ◆ ETF is 2/3 full size
- ◆ Curved Blade Springs vs Straight Springs
 - ◆ Extra Compliance Tuning Step
- ◆ Different resonant frequencies
- ◆ East coast vs West coast

Compliance Measurements



Test Design and Model

- ☀ Does the design meet specifications
- ☀ Stage 2 actuators



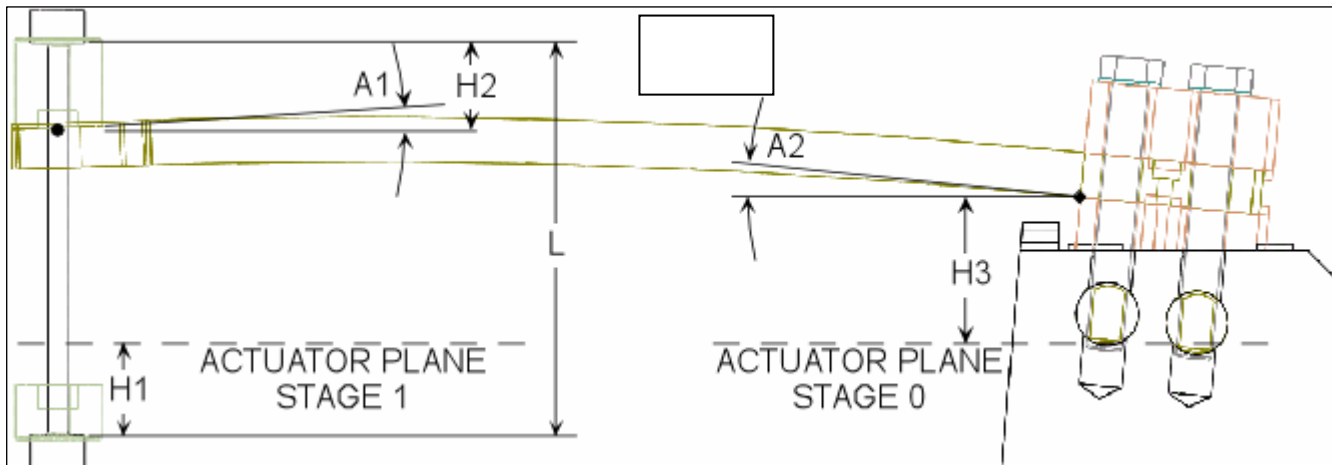
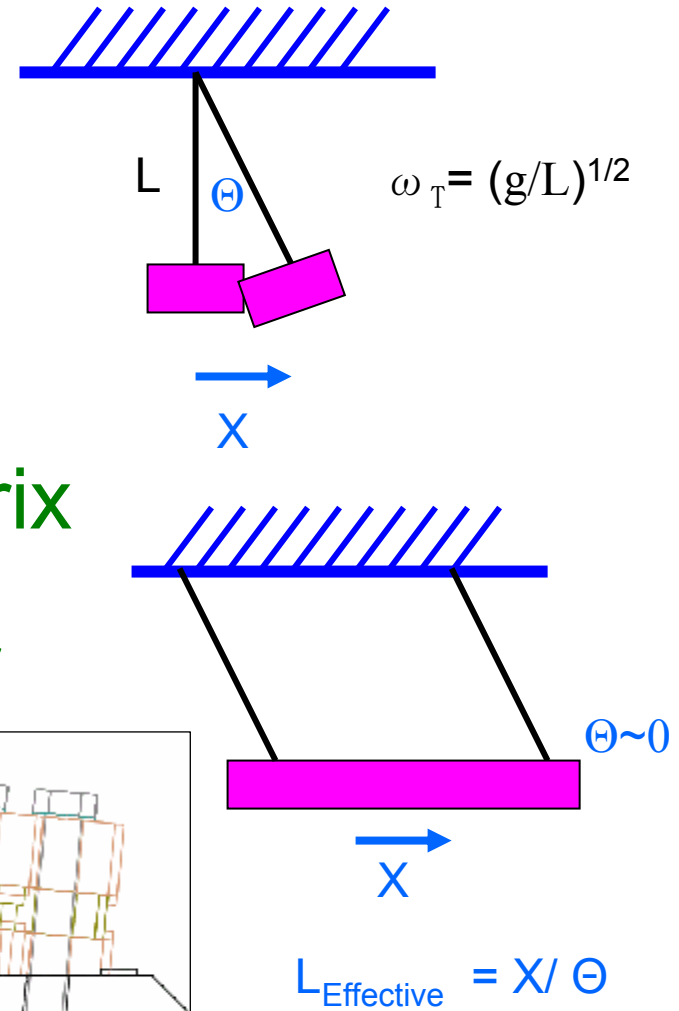
Test Assembly Procedure

- ☀ Friction, interference, tolerances

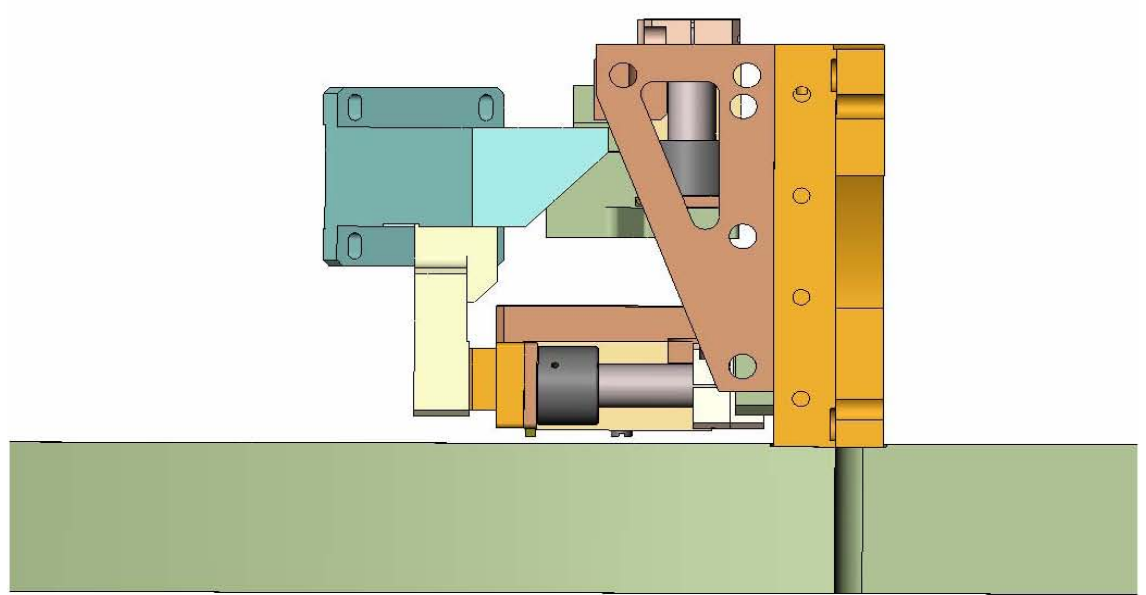


Diagonal Compliance Matrix

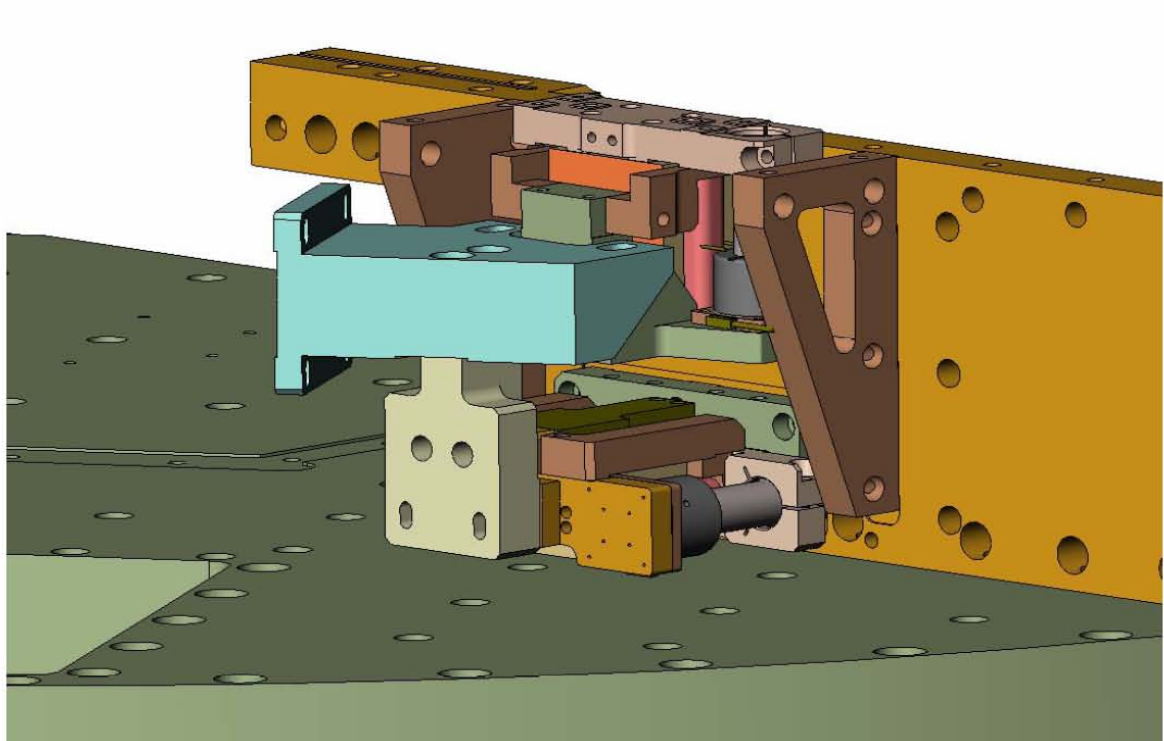
- ☀ Low Tilt Coupling frequency
- ☀ Makes the Control Design Task Easier



Stage 1-2
Actuator
Mounting
Redesign



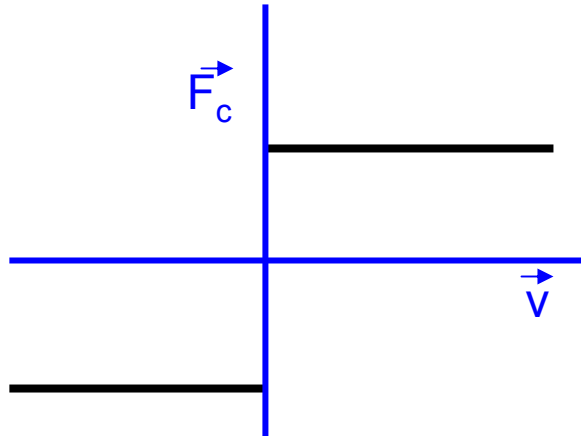
(Moved
down by
1.835")





Non-Linear Compliance

- Seems to fit a Coulomb Friction Model

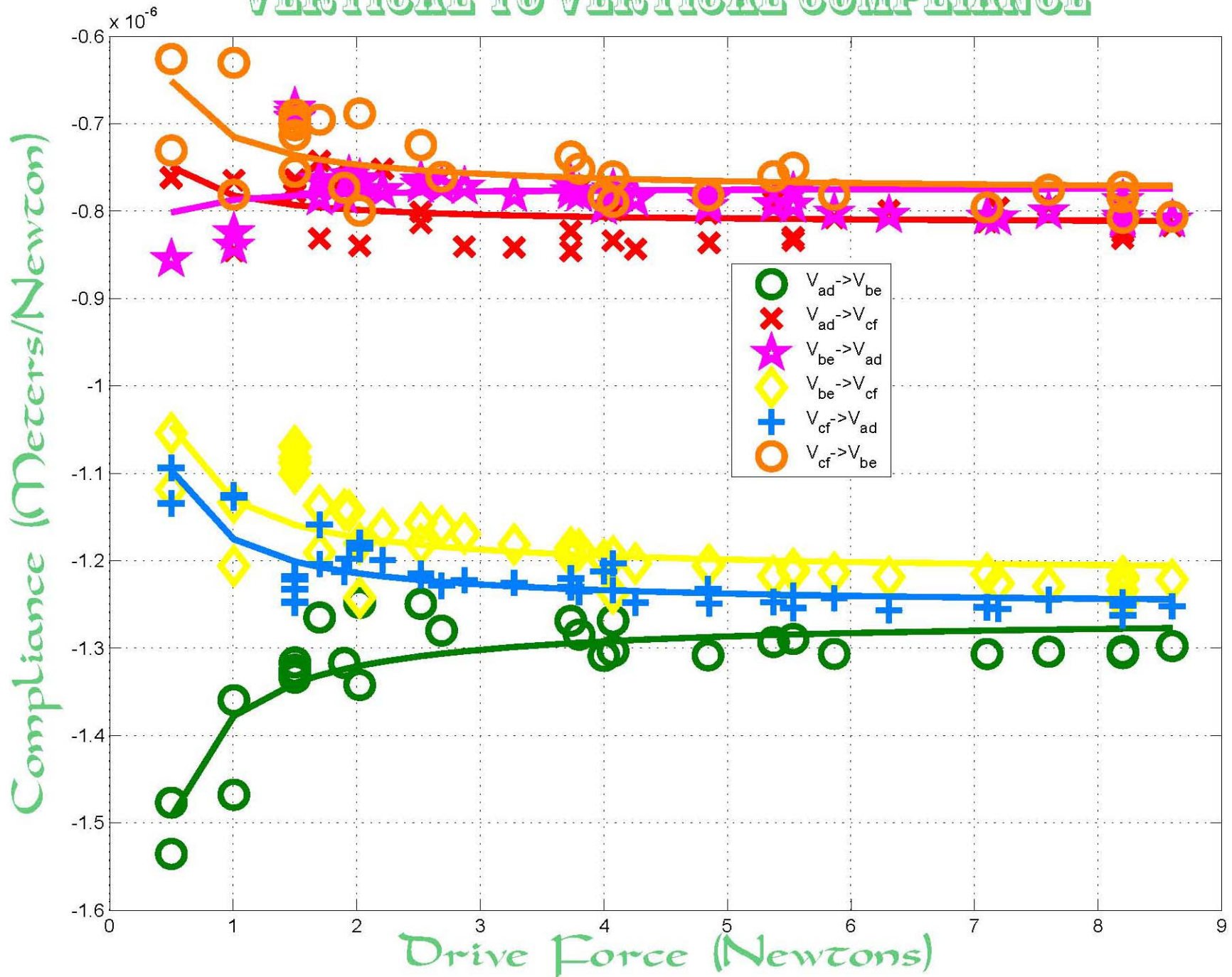


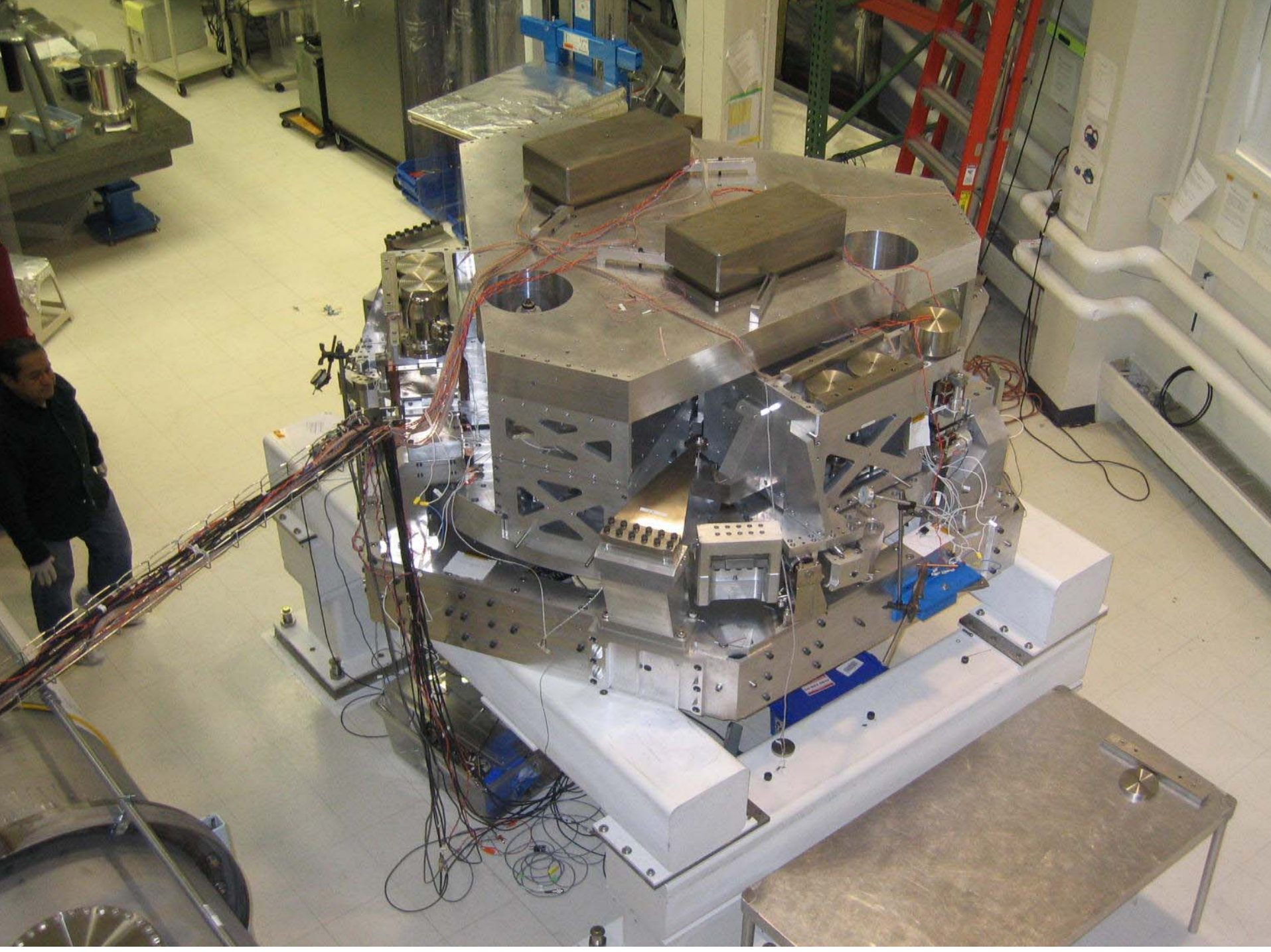
For $F_c \ll F_{\text{drive}}$ Expect
 $C(F) = C_0^*(1 - F_c/F)$

Most (if not all) of the problem was in the wiring, when
We rewired the platform we got about a factor of ten
reduction in F_c

Went from 10's of mNewtons to a few mNewtons

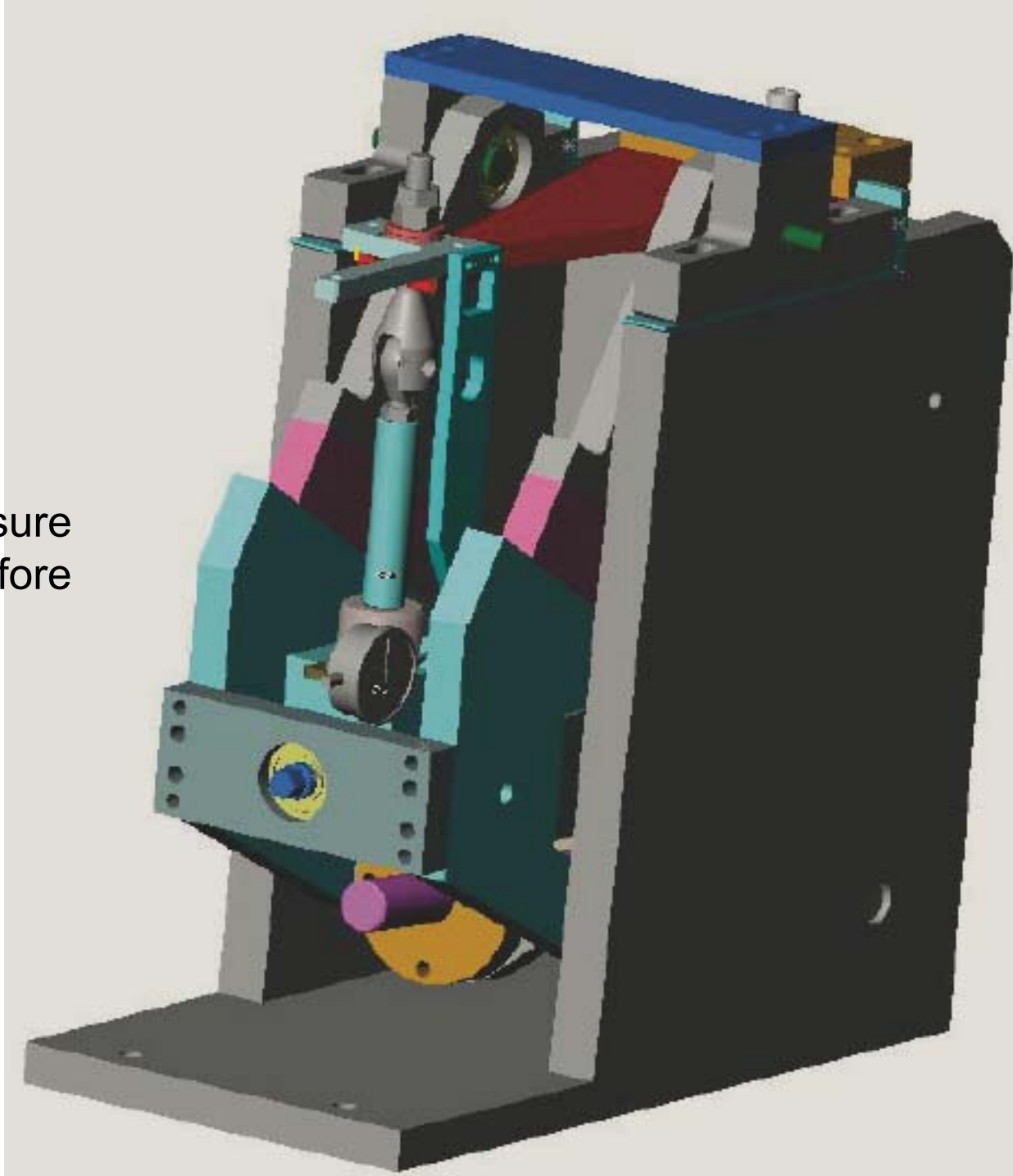
VERTICAL TO VERTICAL COMPLIANCE



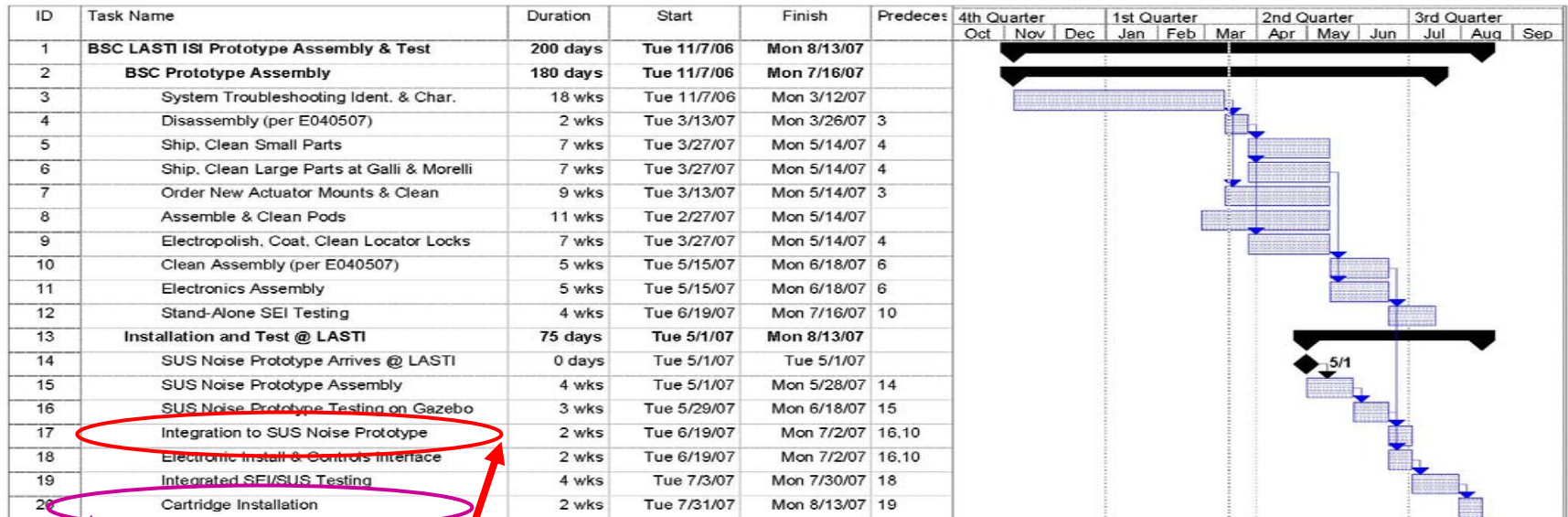


Spring Tester

Supplied by ASI to measure
The spring constants before
installing on the ISI



Schedule



Quadruple Pendulum Noise Prototype is mated to the ISI

ISI and Noise Prototype are inserted into the vacuum chamber

Project: SEI ISI BSC proto schedule 3-
Date: Thu 3/15/07



Time to Move On

